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**MEDICAL REHABILITATION PROGRAM:**  
**III. PSYCHOLOGICAL FACTORS RELATED**  
**TO PROGRAM EFFECTIVENESS**

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BETHESDA, MARYLAND



**MEDICAL REHABILITATION PROGRAM:**  
**III. Psychological Factors Related to Program Effectiveness**

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## Summary

Medical problems account for a significant proportion of attrition from military basic training. A Medical Rehabilitation Program (MRP) implemented at the Recruit Training Command (RTC), San Diego reduced attrition in recruits who experienced treatable medical problems in basic training from 70% to 30% for an estimated savings of between \$331K and \$487K in direct training costs for every 10,000 recruits trained. However, even the reduced rate represented excess attrition relative to the general recruit population. The present study tested the hypothesis that psychological reactions to the onset of a medical problem would predict subsequent success or failure in basic training.

Study participants ( $n = 364$ ) were recruits admitted to the MRP with a treatable medical problem. Most problems involved musculoskeletal injuries or severe viral or bacterial infections. On entry into the MRP, recruits who volunteered to participate completed questionnaires measuring general personality traits, perceptions of their typical and current health status, how they were coping with their medical problem, and their mood. Whether the recruits graduated from training or attrited from training following their recovery from illness was determined from records kept at RTC.

Analyses indicated that recruits who attrited after experiencing a medical problem in training were more neurotic and less extraverted, open, conscientious, and agreeable than recruits who subsequently graduated. These personality attributes are known to be stable characteristics of individuals, so these differences probably existed prior to the onset of the medical problem. To determine whether reactions to the medical problem itself were related to attrition from training, differences between attrites and graduates were determined for perceptions of health, coping, and mood with statistical controls for the personality differences between the groups. The statistical controls ensured that any differences in measures of presumed reactions to illness were not merely reflections of pre-existing personality differences between attrites and graduates. These analyses indicated that attrites differed substantially from graduates with regard to the perceived severity of health problems and negative emotional states, but differences in coping were minor. The differences between recruits who subsequently attrited for medical problems and those who subsequently attrited for other reasons were consistently small and statistically

nonsignificant, so the contrasts between graduates and attrites cannot be attributed to more severe reactions on the part of those with objectively more severe medical problems.

The evidence supported the hypothesis that psychological reactions to medical problems contribute to attrition. Reducing the negative effects of medical problems on morale and motivation was one goal in the development of the MRP. The substantial success of the program probably is attributable in part to achieving this goal. Augmenting the initial MRP with counseling or other psychological interventions to eliminate residual negative effects could help further reduce the attrition rate to bring it closer to the rate for the general recruit population.

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## Introduction

The cost of recruiting and providing basic training for military recruits is substantial, so it is important that those who are recruited serve their full tour of duty productively. Acute medical problems are commonplace in basic training and can impede progress toward successful completion of training. Observational evidence suggests that health problems during basic training demoralize some recruits to the point that an otherwise competent individual fails to function effectively. Even successful rehabilitation may leave negative attitudes that can affect subsequent Navy careers (Farkas, 1980).

A recently implemented Medical Rehabilitation Program (MRP) at the Recruit Training Command, San Diego reduced attrition among those who were sick or injured from 76.1% to 28.2% (Hervig, Vickers & Bischoff, 1991). The estimated savings in direct training costs associated with this reduction savings was between \$331,000 and \$487,000 for every 10,000 recruits trained. However, even recruits who had significant, but remediable, medical problems had excess attrition compared to the recruit population as a whole. The present study assessed the extent to which MRP outcome was influenced by psychological attributes of recruits entering the MRP.

The present study assumed that MRP outcome would be related to two general categories of psychological attributes. The first category is comprised of personality variables that are believed to be pre-existing attributes which the recruit brings to basic training. The second category consists of what are presumed to be reactions to the specific circumstances of basic training with an emphasis on the health problem that the recruit has encountered. This category consists of measures of perceived health, mood state, and coping styles. These three categories of reaction have been grouped for present purposes because they are likely to be closely related. For example, how a recruit copes with illness may be influenced by the perceived severity of that illness and coping, in turn, may influence affective reactions. In general, more severe illness would be expected to be associated with passive coping styles because more severe illness may be comparable to experiencing strong situational controls on coping options (Pearlin & Schooler, 1978). Passive coping, in turn, is associated with stronger negative emotion (Coyne, Aldwin & Lazarus, 1981). The two major categories of attributes also are related. In the recruit population,

personality is related to coping (Vickers, Kolar & Hervig, 1989) and to mood (Vickers, Kusulas, Hervig & Marshall, in review). Conceptually, these associations arise because stable personality attributes represent predispositions or capacities to respond to stimuli such as the stresses of training in particular ways.

The two general categories of psychological attributes were expected to be related to MRP outcome on the basis of prior studies of personality, morale, and motivation as predictors of success in basic training (Kamp & Hough, 1988; Youngblood, Meglino, Mobley & Moore, 1980). Based on established patterns of relationships among the psychological variables, it was expected that some recruits would demonstrate a combination of neurotic tendencies, passive coping, negative affect, and poor perceived health. Other recruits were expected to combine conscientiousness, extraversion, positive affect, and problem solving coping. The first set of attributes was expected to be associated with attrition and the second set of attributes with success.

The predicted pattern of associations between psychological attributes and attrition was derived by a theoretical extrapolation from past attrition findings. The theoretical basis for the formulation was that psychological attributes are related to attrition because they either influence, in the case of personality predispositions, or represent the processes of adaptation to the demands of basic training. The occurrence of a significant medical problem during training represents an event which can challenge the adaptive capabilities of the individual, and therefore, should be a critical stimulus for the processes which will be differentially activated depending on personality. From this perspective, attrition following a medical problem is just one instance of the effects of adaptive processes that go on with greater or lesser success in response to any challenge in training. Results from prior work, therefore, can be generalized to make predictions about attrition. Based on this reasoning, the following predictions were made:

- (a) Coping: High scores on emotional-control coping and low scores on problem-solving coping would be associated with a higher probability of subsequent attrition.
- (b) Mood: High negative mood and low positive mood scores would be associated with a higher probability of attrition.
- (c) Health Status: Poorer perceived health would be associated with a higher probability of attrition.

(d) Personality: Higher neuroticism, lower conscientiousness, and lower extraversion would be associated with increased probability of attrition.

### Method

#### Sample

Recruits in Basic Training (BT) with significant, but remediable, health problems were admitted to the Medical Rehabilitation Program based on criteria described elsewhere (Bischoff, in preparation; Hervig et al., 1991). Data to test the hypotheses in this study were collected from recruits entering the MRP between 1 March 1989 and 31 October 1989 who volunteered to participate after being informed of the nature of the study. One element of the information provided to the potential participants was that their medical care would not be affected in any way by their decision regarding participation.

The typical recruit volunteer (n=364) was 20.1 years of age (S.D.=3.17; range = 17-35). Most volunteers had a high school diploma (79.4%) or a Graduate Equivalence Degree (15.6%), but a few had not completed high school (5.0%). The primary ethnic group was Caucasian (71.1%) with Blacks (18.1%) and Hispanics (7.9%) the largest minorities.

#### Training Outcome

Training outcome was determined from computerized records maintained at the Recruit Training Command, San Diego. For each recruit who entered the MRP, it was determined whether he graduated from basic training or was discharged prior to successful completion of training. Specific codes giving the reason for discharge were used to classify the non-graduates as discharged for medical reasons or discharged for behavioral or performance problems. Analyses, therefore, employed a grouping variable that had graduate, behavioral attrite, and medical attrite as the three groups studied.

#### Instruments

Health Perceptions. A 40-item Health Perceptions Questionnaire (HPQ) was administered on entry into MRP. The first 32 HPQ items comprised a set of measures of perceived general health (Ware, Davies-Avery & Donald, 1978). Responses were made using a 5-point Likert scale from "definitely true" to "definitely false." Items were scored so that high scores corresponded to the name of the scale, e.g., a high score on "resistance to illness" indicated reports that the

person perceived himself as being less likely than the average person to become ill. Scales from this instrument included:

- a) Prior Health measured a person's perceived past health status, e.g., "I have never been seriously ill in my life." (3 items; Cronbach's alpha = .65)
- b) Current Health measured a person's perceived current health status, e.g., "According to the doctors I've seen, my health is now excellent." (9 items; Cronbach's alpha = .88)
- c) Health Outlook measured expected future health, e.g., "I will probably be sick a lot in the future." (4 items; Cronbach's alpha = .79)
- d) Resistance to Illness measured perceived resistance to illness, e.g., "I seem to get sick a little easier than other people." (4 items; Cronbach's alpha = .78)
- e) Sickness Orientation measured the tendency to accept illness as a part of life, e.g., "I accept that sometimes I'm just going to be sick." (2 items; Cronbach's alpha = .60)
- f) Health Worry/Concern measured the degree of worry about health, e.g., "My health is a concern in my life." (4 items; Cronbach's alpha = .69)
- g) Rejection of the Sick Role measured the degree to which the person adopts a sick role when ill, e.g., "I try to avoid letting an illness interfere with my life." (4 items; Cronbach's alpha = .60)

A scale regarding attitudes toward going to the doctor from the original Ware et al. (1978) HPQ was dropped because of a printing error in one of the two items comprising this brief scale. Analysis of a single-item scale did not seem worthwhile given the high expectation that the item would have low reliability relative to the multi-item composites and because the particular scale was not critical for testing the study hypotheses.

The next six HPQ items comprised Haig, Scott, and Wickett's (1986) Illness Index which measured physical dysfunction and discomfort using a 5-point Likert response scale. Scales from this instrument were:

- a) Dysfunction Component measured the degree of disruption of social activity, mobility, and physical activity. (3 items; Cronbach's alpha = .47)
- b) Discomfort Component measured the quality, duration, and intensity of discomfort due to the injury or illness. (3 items; Cronbach's alpha = .61)

The final two HPQ items adapted Mobley, Hand, and Logan's (1977) assessment of general expectations of success in basic training to reflect the impact of illness on perceived likelihood of completing training. One item asked about the current perceived probability of successfully completing basic training. The second item asked the recruit to indicate how much his medical problem had decreased his chances of graduating from training. Both items were answered on a 5-point Likert scale ranging from "strongly disagree" (scored 1) to "strongly agree" (scored 5), and the second item was reverse scored so a high scale score indicated greater perceived probability of completing training. Cronbach's alpha for this composite was .84.

Portions of the HPQ were completed by 312 recruits. Because of missing data in partially completed questionnaires, sample sizes for particular scales ranged from 274 to 312 (202 - 211 graduates; 62 - 67 behavioral attrites, except for discomfort which was completed by only 45 behavioral attrites; and 27 - 34 medical attrites).

Mood. A modified version of the Mood Questionnaire (Ryman, Biersner & LaRocco, 1974) was administered to assess mood states. One modification included adding 11 exploratory items to the original 40 items to test the potential utility of expanding the coverage of the mood domain. These exploratory items were not used in the data analyses reported here. A second modification was a change from the original 3-point Likert scale for responses to a 5-point Likert scale ranging from "not at all" to "very much." This revised scale corresponds to response options used in other mood inventories (Watson, 1988). Finally, the time frame for responses was modified from feelings "right now" to feelings over the past two days. This shift was made to focus attention on overall reactions to the medical problem rather than reactions to having just arrived at the MRP. Scores were computed for the following scales:

- a) Activity - e.g., lively, energetic, cheerful (6 items; Cronbach's alpha = .88).
- b) Anger - e.g., irritated, mean, annoyed (6 items; Cronbach's alpha = .88).
- c) Happiness - e.g., content, calm, satisfied (7 items; Cronbach's alpha = .87).
- d) Anxiety - e.g., afraid, uneasy, jittery (6 items; Cronbach's alpha = .87).
- e) Depression - e.g., low, blue, downcast (6 items; Cronbach's alpha = .94).
- f) Fatigue - e.g., weary, lazy, drowsy (5 items; Cronbach's alpha = .83).

At least part of the Mood Questionnaire was completed by 342 recruits. Because of missing data within the questionnaire, sample sizes for the analyses involving particular scales ranged from

332 to 339 (227 - 232 graduates; 69 - 70 medical attrites; and 33 - 36 behavioral attrites).

Coping. A 24-item questionnaire based on the Ways of Coping Questionnaire (Folkman, Lazarus, Dunkel-Schetter, DeLongis & Gruen, 1986) assessed coping styles. Responses were made on a 4-point Likert scale ranging from "not used" to "used a great deal." Instructions emphasized that the responses to the coping questions should refer to how the recruit was dealing with the injury or illness rather than boot camp in general. The specific scales were:

- a) Positive Reappraisal measured the tendency to look for benefits arising from the challenge of the situation, e.g., concentrated on something good that could come out of the whole thing. (3 items; Cronbach's alpha = .69)
- b) Problem Solving measured the effort to define a problem, develop and implement plans to deal with it, e.g., just concentrated on what I had to do next--the next step. (3 items; Cronbach's alpha = .63)
- c) Confrontive Coping measured the degree to which a person goes to the source of the problem to work out a solution if possible, e.g., tried to get the person responsible to change his or her mind. (3 items; Cronbach's alpha = .52)
- d) Self-Blame measured the degree to which a problem was thought to be a personal failure brought on by one's own actions, e.g., realized I brought the problem on myself. (2 items; Cronbach's alpha = .43)
- e) Wishful Thinking About Situation measured the degree to which a person thinks about other times and places when things were better or about improving the situation, e.g., wished I could change what had happened. (2 items; Cronbach's alpha = .61)
- f) Wishful Thinking About Self measured the degree to which a person thought about ways to improve or change the self or self-image, e.g., wished I could change the way I felt. (2 items; Cronbach's alpha = .43)
- g) Emotional Control measured the attempt to control emotional reactions or behaviors, e.g., tried to keep my feelings from interfering with other things too much. (3 items; Cronbach's alpha = .49)
- h) Distancing measured the degree to which a person attempts to remove the emotional impact of a situation, e.g., went on as if nothing had happened. (3 items; Cronbach's alpha = .55)
- i) Seeking Social Support measured the degree to which other people are sought for information and to discuss thoughts, feelings and ideas, e.g., talked to someone about how I was feeling. (3 items; Cronbach's alpha = .60)

Scales (a), (b), and (c) are the best established indicators of problem-solving coping. Scales (d) through (h) are the best established indicators of emotional-control coping. Scale (i) cannot be reliably classified in either category.

Portions of the coping questionnaire were completed by 335 recruits. Because of missing data in the completed questionnaires, actual sample sizes for the analyses ranged from 318 to 330 (222 - 228 graduates; 63 - 67 medical attrites; and 32 - 37 behavioral attrites).

Personality. The 60-item NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1989) assessed the five-factor representation of personality which has been proposed as a comprehensive general description of personality (cf., Digman, 1990; John, 1990). The NEO-FFI provides reliable assessments of these major dimensions and the measures have good discriminant and convergent validity when peer ratings are used as the comparison criterion (Costa & McCrae, 1989; McCrae & Costa, 1987). Responses were made using a 5-point Likert scale ranging from "strongly disagree" to "strongly agree." The specific measures were:

- a) Neuroticism assessed adjustment vs. emotional instability and identified individuals prone to psychological distress, unrealistic ideas, excessive cravings or urges, and maladaptive coping responses. (12 items; Cronbach's alpha = .86)
- b) Extraversion assessed quantity and intensity of interpersonal interaction, activity level, need for stimulation, and capacity for joy. (12 items; Cronbach's alpha = .82)
- c) Openness assessed proactive seeking and appreciation of experience for its own sake; toleration for and exploration of the unfamiliar. (12 items; Cronbach's alpha = .61)
- d) Agreeableness assessed the quality of one's interpersonal orientation along a continuum from compassion to antagonism in thoughts, feelings, and actions. (12 items; Cronbach's alpha = .76)
- e) Conscientiousness assessed the individual's degree of organization, persistence, and motivation in goal-directed behavior; extreme scores contrast dependable, fastidious people with those who are lackadaisical and sloppy. (12 items; Cronbach's alpha = .88)

#### Analysis Procedures

Oneway analysis of variance (ANOVA) with attrition status as the group variable provided an overall test for the significance of group differences in personality. Planned pairwise

comparisons were made between each pair of groups to determine the basis for any significant overall differences. These analyses were conducted with the ONEWAY procedure of the SPSS\* computer package (SPSS, Inc., 1988).

Analyses of covariance with attrition status as the group variable and the five personality dimensions as covariates provided tests of the hypothesized differences in health status and adjustment processes. The intent of using personality measures as covariates was to obtain more precise estimates of the effect of training in general, and presumably illness in particular, on situational reactions. This specific focus was important, because programs can be designed to modify these reactions if they are important determinants of attrition. Personality was regarded as a more stable source of variance that was not likely to be affected by programs implemented within the training setting.

All five personality dimensions were used as covariates, despite prior evidence that not all of these dimensions would be significant predictors for at least mood and coping. This decision was made because there was no satisfactory a priori basis for selecting a set of personality predictors for the health perception measures. The use of all five personality dimensions provided a consistent treatment across the different dependent variables at the cost of two or three degrees of freedom in cases where specific predictors were nonsignificant.

To focus on the most statistically defensible differences between groups, a Bonferroni procedure (Dunn, 1958) was employed to set significance levels. The significance criterion was fixed at  $p < .002$ , thereby ensuring an experiment-wide probability of Type I error of  $p = .062$ . However, the actual experiment-wide error probability would be less than this, because many of the measures tested were correlated.

## Results

### Personality Risk Factors

Table 1 shows that, as predicted, graduates reported higher conscientiousness and extraversion and lower neuroticism compared to attrites. The significant overall effect for extraversion, however, was attributable primarily to the difference between graduates and behavioral attrites as the comparison between graduates and medical attrites was not significant.

No predictions were made for agreeableness and openness to experience. The analysis

showed smaller, but still statistically significant, group differences for agreeableness. Here again, the primary difference was between graduates and behavioral attrites, as the former were more agreeable than the latter. Medical attrites differed very little from the graduates. The differences on these two dimensions were less than on the three dimensions for which predictions were made.

#### Adjustment Process Differences

Coping Coping differences between attrites and graduates generally were in the predicted direction, but none were significant using the Bonferroni criterion. Only Positive Reappraisal ( $p < .015$ ) would have been significant if the more lenient ( $p < .05$ ) criterion had been used. Planned contrasts indicated that the graduates had significantly higher positive reappraisal scores than the medical attrites ( $t = 2.62, p < .012$ ), but not significantly higher than the behavioral attrites ( $t = 1.92, p < .057$ ).

Mood Depression and anxiety met the Bonferroni significance criterion, and activity, anger, and happiness would have met a  $p < .05$  criterion. Fatigue differences were nonsignificant by either criterion ( $p > .335$ ).

Planned contrasts were performed with one-tailed significance tests which assumed that success would be associated with higher positive and lower negative moods. These contrasts indicated that graduates scored significantly higher than medical attrites on activity ( $t = 3.21, p < .001$ ) and happiness ( $t = 1.95, p < .029$ ) and lower than medical attrites on anxiety ( $t = -2.81, p < .004$ ) and depression ( $t = -2.00, p < .026$ ), but did not differ significantly from medical attrites on anger and fatigue. Graduates scored significantly lower than behavioral attrites on depression ( $t = -2.83, p < .003$ ), anxiety ( $t = -2.38, p < .010$ ), and anger ( $t = -1.99, p < .025$ ) and significantly higher on happiness ( $t = 1.86, p < .033$ ), but these groups did not differ significantly on activity or fatigue. The two attrite groups did not differ significantly on any measure ( $p > .24$ , two-tailed, for each contrast).

Perceived Health Only BT expectations and health outlook produced differences that were significant by the Bonferroni criterion. Current health, sickness orientation, discomfort, and dysfunction produced differences that were significant by the  $p < .05$  criterion.

**Table 1**  
**Comparisons of Basic Training Attrites and Graduates**

	Medical Attrites <u>Mean</u>	Behavioral Attrites <u>Mean</u>	Gradu- ates <u>Mean</u>	<u>Sp</u>	<u>F</u>	<u>p</u>
<b>Demographics</b>						
Age	19.66	19.84	20.15	3.24	.49	.613
Hi grade completed	11.57	11.79	11.79	1.31	.44	.644
<b>NEO</b>						
Neuroticism	2.10	2.46	1.69	.74	33.28	.000
Extraversion	2.33	1.93	2.49	.55	29.42	.000
Openness	2.21	2.09	2.25	.47	3.25	.040
Conscientiousness	2.72	2.40	2.95	.55	29.63	.000
Agreeability	2.59	2.36	2.62	.51	7.60	.001
<b>Health Perceptions</b>						
Prior health	3.47	3.26	3.48	.97	1.21	.300
Current health	2.73	2.74	3.03	.71	5.30	.006
Health outlook	3.58	3.56	3.86	.64	6.92	.001
Health worry/concern	3.39	3.54	3.36	.77	1.33	.266
Resist/susceptibility	3.55	3.45	3.55	.70	.60	.552
Sickness orientation	3.17	3.25	3.58	1.02	4.38	.013
Reject sick role	3.86	3.86	3.92	.58	.41	.664
Dysfunction	1.97	1.98	1.75	.56	5.42	.005
Discomfort	2.71	2.60	2.37	.71	4.02	.019
BT expectations	2.85	2.86	3.96	.98	41.78	.000
<b>Ways of Coping</b>						
Positive reappraisal	2.39	2.55	2.73	.74	4.25	.015
Problem solving	2.45	2.58	2.70	.67	2.28	.104
Wish think situation	2.88	2.94	2.89	.78	.12	.884
Social support	2.23	2.26	2.23	.77	.04	.961
Self blame	1.96	2.08	2.16	.85	1.01	.365
Distancing	1.91	2.15	2.15	.66	1.85	.160
Emotional control	2.68	2.77	2.62	.68	1.10	.334
Wish think self	2.74	2.50	2.47	.86	1.39	.250
Confrontational	1.66	1.66	1.70	.61	.13	.880
<b>Mood Questionnaire</b>						
Activity	2.27	2.43	2.61	.81	3.59	.029
Anger	2.28	2.37	2.14	.81	2.48	.086
Happiness	2.20	2.23	2.43	.78	2.43	.090
Anxiety	2.55	2.39	2.10	.81	7.03	.001
Depression	2.83	2.91	2.51	.89	6.41	.002
Fatigue	2.47	2.43	2.33	.79	.84	.434

NOTE:  $s_p$  = Pooled within-group standard deviation. Mean values for health perceptions, coping, and mood are adjusted for group differences in personality (see Analysis Procedures).

Relative to medical attrites, planned contrasts showed graduates significantly higher on BT expectations ( $t = 4.87, p < .001$ ), current health ( $t = 2.38, p < .011$ ), and sickness orientation ( $t = 2.25, p < .015$ ), and lower than medical attrites on dysfunction ( $t = -2.42, p < .010$ ) and discomfort ( $t = -2.68, p < .006$ ). Relative to behavioral attrites, graduates were higher on BT expectations ( $t = 7.26, p < .001$ ), health outlook ( $t = 3.30, p < .001$ ), current health ( $t = 2.96, p < .002$ ), and sickness orientation ( $t = 2.39, p < .010$ ), but lower on dysfunction ( $t = -2.79, p < .003$ ) and discomfort ( $t = -1.89, p < .032$ ). Again, none of the differences between the attrite groups were significant ( $p > .34$ , two-tailed, for each contrast).

Strength of Associations to Attrition The significance levels for the differences between graduates and attrites do not directly indicate the strength of association between the psychological variables and attrition. Table 2 shows the attrition rate for individuals in the upper 50% of the distribution of scores on the psychological variables compared to those in the lower 50% of the distribution of scores. The comparisons have been limited to measures which were significantly different ( $p < .10$ ) in the overall group comparisons. In addition, the behavioral and medical attrites have been combined because these groups did not differ significantly on any of the psychological measures, and the combination provides an overall assessment of attrition.

Perhaps the best summary of the predictive value of the psychological variables is provided by the risk ratio in the last column of Table 2. This ratio was obtained by dividing the attrition rate for recruits who were in the upper 50% of the distribution of scores (high scorers) by the attrition rate for recruits who were in the lower 50% of the distribution of scores (low scorers). These values indicate that high scorers on neuroticism, discomfort, dysfunction, and depression had attrition rates that were 187% to 255% of the rates for low scorers on the same variable. The reverse pattern was observed for extraversion, conscientiousness, and BT expectations, where high scorers had attrition rates that were 27% to 45% of the corresponding rate for low scorers.

**Table 2**  
**Attrition Rates as a Function of**  
**Status on Significant Psychological Predictors**

<u>Scale</u>	Attrition Rate for Recruits:		Difference in Rates <sup>b</sup>	Risk Ratio <sup>c</sup>
	<u>High Scorers<sup>a</sup></u>	<u>Low Scorers<sup>a</sup></u>		
<b><u>NEO</u></b>				
Neuroticism	46.2	18.1	28.1	2.55
Extraversion	18.7	45.6	-26.9	.41
Openness	28.2	37.2	-9.0	.76
Conscientiousness	20.1	45.1	-25.0	.45
Agreeability	27.0	38.4	-11.4	.70
<b><u>Health Perceptions</u></b>				
Current health	26.3	40.9	-14.6	.64
Health outlook	27.3	38.0	-10.7	.72
Sickness orientation	25.6	39.1	-13.5	.65
Dysfunction	42.9	18.1	24.8	2.37
Discomfort	34.8	17.5	17.3	1.99
BT expectations	12.7	46.2	-33.5	.27
<b><u>Ways of Coping</u></b>				
Reappraisal	24.2	37.6	-13.4	.64
<b><u>Mood Questionnaire</u></b>				
Activity	24.2	38.9	-14.9	.62
Anger	37.9	24.7	13.2	1.53
Happiness	25.3	37.7	-12.4	.67
Anxiety	37.9	23.7	14.2	1.60
Depression	40.6	21.7	18.3	1.87

<sup>a</sup>High scorers were in the upper 50% of the sample scores and low scorers in the lower 50%. Attrition rate in each group based on medical attrites plus behavioral attrites.

<sup>b</sup>Attrition rate for high scorers - attrition rate for low scorers

<sup>c</sup>Attrition rate for high scorers/attrition rate for low scorers

## Discussion

Excess attrition following treatable illness or injury in basic training is strongly related to the psychological reaction to that medical problem. The strongest predictor of attrition was lower expectations of success in basic training. Individuals scoring above the sample mean on this variable had a 7:1 likelihood of graduating compared to a 1:1 likelihood for individuals below the mean. Other strong predictors included physical discomfort, physical dysfunction, anxiety, and depression. Several other health perceptions formed a third strata of predictors in terms of the strength of predictive power, including current health, health outlook, and sickness orientation.

Collectively, the strongest predictors of attrition suggest that health problems lower morale and motivation, thereby leading to attrition. Impaired morale was evident in the relationships between attrition and negative moods, particularly anxiety and depression. Impaired motivation was evident in the lower estimated probability of success in training (lower BT Expectations), which was studied originally as a component of a motivational model of recruit attrition (Mobley et al., 1977). Impaired motivation also may be implied by greater perceived health problems because ability impairment should lower estimates of the probability of meeting the performance requirements of training, one component of many motivational models (Mitchell, 1974). The morale and motivation reactions may be closely linked, as some theoretical models link depression to impaired expectancies of success (Seligman, 1975).

The inference that the development of a health problem is the starting point for psychological reactions that culminate in attrition is reasonable on several grounds. The fact that anxiety and depression were the strongest mood predictors of attrition is important, because depressive reactions would be expected under conditions of real or anticipated loss (Gormly & Gormly, 1984; Shaver, Schwartz, Kirson & O'Connor, 1987). A moderately severe health problem could be expected to lead the recruit to believe that he stood a chance of failing in basic training. Indeed, the BT expectations measure may be a direct indicator of this perception. These observations were specific and not merely the product of some general negative feelings, because fatigue (a subjective arousal state with negative overtones) did not differentiate between the groups.

A second reason for believing that a health problem is the starting point for psychological reactions that lead to attrition is provided by the pattern of relationships to health perceptions measures. The strongest associations to attrition were for assessments of health outlook, current health, physical dysfunction, and physical discomfort. The strongest single predictor, BT expectations, included an assessment of the impact of the health problem on the probability of successfully completing training. In contrast, ratings of prior health and general susceptibility to health problems, both of which can be interpreted as indicators of general long-term health trends, did not differ significantly between the groups.

A third reason for believing that a health problem is the starting point for psychological reactions that culminate in attrition is that the differences considered above existed even after taking into account group differences in personality. Without the statistical controls employed, it might have been argued that the differences in mood and health perceptions represented nothing more than the continuation of differences in morale and motivation that were determined by the recruit's personality and existed prior to the onset of the health problem. Given that the differences presented in this paper have been obtained controlling for personality differences between attrites and graduates, this argument does not hold. Ideally, the link between illness onset, psychological response, and attrition would be established by a study design that monitored key psychological variables continuously during basic training and noted any changes that followed the onset of a medical problem. This approach was not feasible in the present study, but the same pattern of findings obtained with the present design makes it reasonable to assume that a study with a prospective design would produce comparable conclusions.

Coping measures were not significant predictors of attrition controlling for personality, but these negative findings may be misleading with regard to the importance of coping in the overall adjustment processes. Coping may affect attrition indirectly through its influence on affective status (Vickers et al., 1989). If so, enhancing appropriate coping styles would be one means of modifying those psychological reactions to illness that presumably are the immediate determinants of attrition.

The present study also showed that associations between personality and attrition previously observed in the general recruit population and other populations generalize to the MRP. This finding suggests that the psychological processes involved in MRP attrition represent

a special instance of normal processes affecting a wide variety of situations. One important consideration regarding these processes is that the analyses of covariance in this study implicitly treated personality factors as direct causes of attrition. It is more likely that personality variables influence attrition indirectly by modulating the type and magnitude of psychological reactions to training events. A more appropriate model of attrition might be developed by regarding personality and coping as antecedents of morale and motivational reactions to illness that contribute directly to attrition. Given such a model, the appropriate analytic procedure would be to examine the relationship between personality and attrition controlling for morale and motivation measures. The approach adopted in this study was designed specifically to provide a stringent test of the hypothesis that morale and motivational reactions to illness directly influenced attrition. Controlling for personality variables when testing this hypothesis made it possible to rule out a competing model in which associations between these psychological reactions to illness and attrition were observed because these variables shared personality variables as common causal antecedents.

With a primary competing explanatory model eliminated from consideration, it is reasonable to consider developing more detailed models in which personality is treated as a basis for identifying individuals who are at risk for attrition and describing the processes by which risk actually is translated into attrition. It is important to note that the adoption of a model in which morale and motivation variables are the immediate determinants of attrition, and personality influences attrition only indirectly, will lead to stronger estimates of the influences of these variables on attrition. In the present analyses, any overlapping predictive power possible from the two sets of variables was assigned to personality. In the alternative model, this overlapping predictive power would be assigned to morale and motivation variables. The development of the required process model of attrition was beyond the scope of the present study, but it should be a concern for those interested in developing more refined programs to minimize the effects of psychological factors on attrition following medical problems.

The relationships between MRP outcome and psychological reactions to health problems have two important implications for the MRP. First, the effects of the MRP on acute psychological reactions to medical problems could explain the general success of the MRP. As described in detail elsewhere (Bischoff, in preparation; Hervig et al., 1991), the MRP was

designed to minimize the psychological effects of illness or injury by separating ill recruits from recruits who were being discharged for behavioral problems to reduce attitudinal contagion, by permitting continued attendance at academic classes to provide some ongoing progress toward completing training, and by providing specific rehabilitation programs for musculoskeletal problems which should affect perceptions of the probability of recovery. Each of these aspects of the training program could be expected to modify mood, perceived probability of success in training, or perceived health impact of the medical problem.

The second implication of the findings for the MRP is that the basic program could be augmented by psychological interventions designed specifically to modify the affective and motivational reactions to medical problems. Despite the significant reduction in attrition, further reductions might be achieved by adding counseling or other interventions directed toward the specific psychological reactions noted here.

Overall, this study indicates that psychological reactions to medical problems are an important determinant of MRP effectiveness. Research design limitations imposed by resource constraints make it impossible to estimate the exact contribution of these reactions to the subsequent success of the recruits at this time. Further research to directly verify the interpretations offered here would be useful as a guide to the design of specific psychological interventions to further reduce the effects of treatable medical problems on recruit attrition. Research to evaluate these possibilities could improve on the already effective MRP.

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